REMARKS

Claims 1-5, and 7-20 are now pending in the application. Claim 1 is amended to more clearly describe that the hydrogen vent is a passive hydrogen vent and to include a feature of dependent claim 6; support is found in the original specification, including paragraphs [0020]-[0021]. Claim 6 is cancelled. The dependency of claim 7 is amended in view of the cancellation of claim 6. Claims 11 and 19 are amended to more clearly describe the methods of manufacturing a fuel cell. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

REJECTION UNDER 35 U.S.C. § 103 – DUBOSE & MATSUOKA

Claims 1, 2, 4-9, 11-16, 19 & 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over DuBose (U.S. Pat. No. 6,013,385) in view of Matsuoka (U.S. Pub. No. 2004/0062964). This rejection is respectfully traversed.

The combination of DuBose and Matsuoka fails to disclose a passive hydrogen vent configured to vent hydrogen from an enclosure without reliance upon any electrical device to maintain the hydrogen concentration within the enclosure below about 4 percent. As such, the reference combination cannot establish a *prima facie* case of obviousness. See *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991) (obviousness requires that the combined references teach or suggest all the claim limitations). Moreover, there is no apparent reason identified as to why a skilled artisan would include the missing subject matter. See *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1740-41, 82 USPQ2d 1385, 1396 (2007) (obviousness includes determining whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue). And any attempt to incorporate the presently claimed passive hydrogen vent would actually render the DuBose device inoperable, which squarely defeats obviousness. See *McGinley v. Franklin Sports Inc.*, 262 F.3d 1339, 60 USPQ2d 1001, 1010 (Fed.Cir. 2001) ("If references taken in combination would produce a 'seemingly inoperative device,' we have held that such references teach away from the combination and thus cannot serve as predicates for a prima facie case of obviousness.").

Independent claims 1 and 11 are drawn to a fuel cell and a method of manufacturing a membrane electrode assembly (MEA) fuel cell. The fuel cell of amended claim 1 includes a hydrogen flow path, a coolant flow path, an enclosure, and a passive hydrogen vent. Figure 2; paragraph [0017]. The hydrogen flow path is configured to pass hydrogen into communication with an anode catalyst of an MEA. Paragraphs [0015], [0025]. The coolant flow path is configured to pass coolant through the fuel cell to cool the fuel cell. Paragraphs [0017], [0018], [0024]. The enclosure encompasses at least a part of the coolant flow path, where part of the coolant flow path includes a coolant reservoir. Paragraphs [0019], [0022], [0024], [0025]. The passive hydrogen vent is configured to vent hydrogen from the enclosure without reliance upon any electrical device in order to maintain the hydrogen concentration within the enclosure below about 4 percent. Paragraphs [0019]-[0021], [0023]-[0025]. For example, the passive hydrogen vent may be continuously allowing hydrogen to leave the enclosure so that hydrogen concentration never exceeds 4 percent.

The method of manufacturing an MEA fuel cell of claim 11 includes creating a hydrogen fuel flow path to conduct hydrogen through the MEA fuel cell. Figures 1, 2; paragraphs [0015], [0025]. An enclosure is created around a fuel cell stack which captures hydrogen that leaks, directly or indirectly, from the hydrogen fuel flow path. Paragraphs [0019], [0022], [0024], [0025]. A hydrogen vent is provided in the enclosure where the hydrogen vent is configured to maintain the level of hydrogen which leaks into the second enclosure below a concentration level of about 4 percent. Paragraph [0021].

In contrast, the DuBose and Matsuoka references fail to disclose the present hydrogen vent or providing such a vent in a method of manufacturing a fuel cell. The primary reference DuBose is provided for disclosing a fuel cell gas management system. Abstract. The anode fuel stream (i.e., H_2) is directed to an anode reservoir 92 which also serves as a deionized water reservoir. DuBose Figure 3, 7:66-8:3; 9:7-9. The anode reservoir 92 is therefore constantly pressurized (with H_2 and dH_2O), and to protect against excessive pressurization is fitted with a relief valve 94. As is generally known, a relief valve is set to open at a predetermined pressure to protect a pressurized vessel from exceeding its design limit. In this case, the DuBose anode reservoir 92 by

its very design must remain significantly pressurized as it contains the fresh and recycled anode fuel streams. If the relief valve allowed the H_2 to vent from the anode reservoir 92 in order to maintain the hydrogen concentration within the reservoir below about 4 percent, the vast majority of incoming pressurized H_2 used to power the fuel cell would be vented and lost. Incorporating the presently claimed passive hydrogen vent would consequently contravene operation of the DuBose device. DuBose therefore cannot be used to establish a case of obviousness.

Hence, the relief valve 94 does not keep the fuel cell system operating safely by eliminating the accumulation of hydrogen gas in the reservoir, as alleged on page 3, lines 2-3 of the Office Action dated March 4, 2008. It is both essential and purposeful in the design of DuBose to accumulate pressurized hydrogen in the anode reservoir 92. The relief valve 94 simply maintains safe pressurization limits. Since the relief valve 94 is operating in a different fashion than the present valve and since the valve cannot be modified or substituted with the presently claimed passive hydrogen vent, the present claims are not obvious.

In addition to the relief valve 94, the DuBose reference includes a timed computer control purge vent 96 for the anode reservoir 92. Figure 3; 8:7-11. This purge vent 96 periodically purges the anode circuit to eliminate accumulation of inert gas or air (i.e., O_2) in the anode which could lead to an explosive condition when mixed with the anode gas (i.e., H_2). Thus, this purge vent 96 is not venting hydrogen originating from the coolant but is instead used to remove accumulated air from the anode/dH_2O reservoir 92. The purge vent 96 is also electronically controlled and is therefore contrary to the present claims. As such, the present claims are not obvious since the purge vent 96 does not function as the presently claimed passive hydrogen vent and cannot be modified to function in a similar fashion.

Finally, nowhere does DuBose teach that either the relief valve 94 or the purge valve 96 separates fuel cell exhaust gases from liquid water, as alleged at the bottom of page 2 of the Office Action dated March 4, 2008.

The addition of the Matsuoka reference fails to overcome the deficiencies of the DuBose reference. Matsuoka is provided for allegedly disclosing an enclosure that houses the entire fuel cell system. As best can be ascertained, Applicants assume the

chassis 3 of the fuel battery 1 constitutes the alleged enclosure. Matsuoka Figure 1; paragraph [0030]. Applicants respectfully request clarification if the Examiner intends a different enclosure. However, regardless of whether the chassis 3 or another part of the fuel battery 1 is selected to operate as the enclosure, addition of the enclosure to the fuel cell gas management system of DuBose fails to provide the presently claimed passive hydrogen vent. Neither the relief valve nor purge valve of DuBose is configured to vent hydrogen from an enclosure without reliance upon any electrical device in order to maintain the hydrogen concentration within the enclosure below about 4 percent. As such, the combination of DuBose and Matsuoka fails to include all of the claimed features and cannot establish a prima facie case of obviousness.

Accordingly, Applicants respectfully request reconsideration of the claims and withdrawal of the rejection.

REJECTION UNDER 35 U.S.C. § 103 – DUBOSE, MATSUOKA, & BUZZELLI

Claims 10 & 17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over DuBose (U.S. Pat. No. 6,013,385) in view of Matsuoka (U.S. Pub. No. 2004/0062964) as applied to claims 1 & 16 respectively and further in view of Buzzelli (U.S. Pat. No. 4,168,349). This rejection is respectfully traversed.

Dependent claims 10 and 17 stem from independent claims 1 and 11, respectively. Claims 1 and 11 and the DuBose and Matsuoka references are described in the preceding section.

The Buzzelli reference is further provided for disclosing an iron/air battery system having a sintered ceramic vent effective to allow excess H_2 and O_2 to escape, while acting as a flame and explosion barrier. 2:55-60. The Office Action alleges that one of ordinary skill would modify the vent of Matsuoka with the flame barrier vent of Buzzelli to improve the safety of the fuel cell device.

Matsuoka does not disclose a vent; the reference is provided for teaching a chassis 3 that is alleged to be an enclosure. DuBose discloses a relief valve 94 and a purge valve 96. However, using the sintered ceramic vent of Buzzelli as either valve in DuBose would contravene the operation of the DuBose fuel cell, since the DuBose system requires pressurization of the anode reservoir 92 (by the incoming H_2). It is

therefore not clear how a skilled artisan would adapt or construct the DuBose device in view of Matsuoka and Buzzelli in order to form an operable system where a valve vents hydrogen from the enclosure without reliance upon any electrical device in order to maintain the hydrogen concentration within the enclosure below about 4 percent. As such, the combined references cannot establish a prima facie case of obviousness.

Applicants respectfully request reconsideration of the claims and withdrawal of the rejection.

REJECTION UNDER 35 U.S.C. § 103 – DUBOSE, MATSUOKA, BUZZELLI, & ADAMS

Claims 3 & 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over DuBose (U.S. Pat. No. 6,013,385) in view of Matsuoka (U.S. Pub. No. 2004/0062964) and Buzzelli (U.S. Pat. No. 4,168,349) as applied to claims 2 & 17 respectively and further in view of Adams (U.S. Pub. No. 2004/0151962). This rejection is respectfully traversed.

Dependent claims 3 and 18 stem from independent claims 1 and 11, respectively. Claims 1 and 11 and the DuBose, Matsuoka, and Buzzelli references are described in the preceding sections.

The Adams reference is further provided for disclosing a fuel cartridge having a vent 36 that can operate as a one-way valve which allows air to enter but does not allow fuel or other liquids to exit. Figure 6; paragraph [0056]. The vent 36 can also be an opening covered by a hydrophobic membrane so that liquids (e.g., methanol, water) cannot pass but air is allowed to enter the cartridge. Various polymeric membranes can be used. Paragraph [0056]. It is alleged that a skilled artisan would incorporate the teachings of Adams related to materials for gas permeable and liquid impermeable vents into the combination of DuBose, Matsuoka, and Buzzelli.

Similar to the preceding section, it is not clear how the gas permeable and liquid impermeable polymeric membranes (of Adams) combined with the sintered ceramic flame barrier vent (of Buzzelli) could be adapted to the valves of the fuel cell gas management system of the primary reference DuBose. Even if valves of the DuBose system are combined with either the polymeric membrane and/or sintered ceramic vents, the DuBose system requires H_2 pressurization of the anode reservoir 92,

maintained by the relief valve 94 and periodically purged by the computer controlled purge vent 96. Using a passive hydrogen vent, configured to vent hydrogen from the enclosure without reliance upon any electrical device to maintain the hydrogen concentration within the enclosure below about 4 percent as per the present claims, would cause loss of substantially all of the H_2 in the DuBose fuel cell. Consequently, the combination of references cannot be used to reconstruct the present claims and attempts to do so based on their collective teachings would result in an inoperable device. The combined references therefore cannot establish a prima facie case of obviousness.

Applicants respectfully request reconsideration of the claims and withdrawal of the rejection.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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